FACTS ABOUT SMALL-POX

AND

VACCINATION.

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1. The mortality from small-pox is much less now than in prevaccination times.

Dr. Edwardes, in the *Practitioner*, May, 1896.

Dr. McVail, *Vaccination Vindicated*, pp. 9 and 154.

Sanitation or Vaccination, published by Jenner Society, Gloucester.

Mr. C. E. Paget in *Transactions* Epidem. Soc. 1883-4.

Vaccination Vindicated, p. 25.

Royal Com. Report, vol. vi., p. 282.

Bernouilli, the famous mathematician, calculated that no fewer than 15,000,000 of human beings in the last century died of it every 25 years. Süssmilch, an eminent statistician of the time of Frederick I, estimated that nearly everyone had small-pox, and that it carried off a twelfth part of mankind. In London in 1660-79, of every 80,000 deaths, 4,170 were from small-pox. In Iceland in 1707-9, it killed 18,000 persons in a population of 50 000. In Glasgow, a large and very insanitary town, in 1783-1800, of 31,088 deaths or burials from all causes, 5,959 were due to small-pox. Chester, which on the other hand was described by an eminent authority of the time as a town of "almost incredible" healthiness, had fewer than 15,000 inhabitants, and contained in the year 1775 only 1,060 persons, or one in 14, who had not had small-pox. In Kilmarnock, with 4,000 or 5,000 inhabitants in 1728-64, of every 1,000 children born alive 161 died of small pox. In the village of Ware, in Hertfordshire, after an epidemic in 1722, only 302 persons in a population of 2,515 had never had the small-pox. Such examples could easily be added to. Great diminution of small-pox mortality occurred after the introduction of vaccination where small-pox inoculation never prevailed, and also in places where small-pox inoculation had prevailed.

2. The greatest diminution in the small-pox mortality is found in the early years of life, in which there is most vaccination.

Supplement to Local Government Board Report for 1884.

Royal Com. Report, vol. vi., p. 270.

In Geneva in the period 1580-1760, during which there were 25,349 small-pox deaths, 961 of every 1,000 were under 10 years of age. In Kilmarnock in 1728-64, of every 1,000 small-pox deaths, 988 were under 10 years of age. In a total of 36,755 deaths from small-pox at all ages occurring in Kilmarnock, Edinburgh, Manchester, Warrington, Chester, Geneva, and the Hague in various prevaccination periods from 1580 onwards, 17,252 were under 2 years of age. In the present day, on the other

Supplement to Local Government Board Report for 1884.

hand, vaccination being performed in infancy and having its greatest protective influence in the earlier years of life, small-pox has to a great extent departed from children and transferred itself to later and less protected ages. In London in 1884, of 1,000 small-pox deaths, only 343 were under ten years old. But this calculation includes both vaccinated and unvaccinated persons. In the vaccinated community the corresponding figures were not 343, but 86; and in the unvaccinated, not 343, but 612. Among the unvaccinated the 612 is better than the Geneva 961, and the Kilmarnock 988 of prevaccination times. Vaccination, by lessening the opportunities for infection, and increasing the intervals between epidemics, has helped even the unvaccinated.

Royal Com. Report.

Yet among the unvaccinated in London, Leicester, Dewsbury, and Gloucester, small-pox is still to a great extent a disease of childhood.

In prevaccination times, small-pox, measles, and whooping cough were diseases of childhood. Measles and whooping cough are still diseases of childhood, but small-pox, and especially fatal small-pox, has been to a very remarkable extent driven from vaccinated childhood by means of vaccination. In the same way, what still remains of it can be driven from later periods of life by means of revaccination.

The manner in which small-pox differentiates between the vaccinated and unvaccinated is seen in the incidence of the disease on towns where it has recently prevailed. In Gloucester, for example, there had been extreme neglect of infantile vaccination, and the disease attacked a school and spread there, the scholars being children. In Leicester the infection was accidentally introduced into the scarlet fever hospital and the children being unvaccinated the disease began to spread there. The hospital was then emptied of scarlet fever and no more cases were admitted, and in the town of Leicester scarlet fever cases increased to thousands. In Warrington, on the other hand, infantile vaccination had been well carried out, but there was a want of adult revaccination and the disease fastened on the workmen in a large ironworks. Then the workmen's committee in charge of the sick fund resolved "that any member who remains unrevaccinated after Monday, November 21st, 1892, shall not be entitled to any sick benefit should he be afflicted with small-pox;" and in consequence over 1,400 men were revaccinated by the works' doctor, and many others privately. The result was that after the middle of December there were only 12 cases among the employees, and the health officer of Warrington reported that these were among men who had refused revaccination or joined the works subsequently.

Royal Com. Final Report, Appendix VII.

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The following table teaches a lesson that cannot easily be misread.

Royal Com. Final Report.

Percentage of total small-pox deaths borne by children under 10 years of age in recent outbreaks.

	Vaccination Default in antecedent years.	Percentage of total small-pox deaths borne by children under 10 years of age.
Warrington ...	Very slight	22.5
Sheffield ...	Very slight	25.6
London ...	In 1883-91, 10 per cent.	36.8
Dewsbury ...	In 1882-92, 32.3 per cent.	51.8
Gloucester ...	In 1885-94, 10.6 to 85.1 per cent.... ...	64.5
Leicester ...	In 1883-92, 43.8 to 80.1 per cent. ...	71.4*

* Or 66.6. The difference depends on the exclusion or inclusion of three deaths which occurred owing to the attack of several children in a scarlet fever ward through proximity to the small-pox hospital.

3. In countries where there is much vaccination and revaccination relatively to the population, there is little small-pox.

Dr. Edwardes in *Practitioner*, May, 1896.

Dr. Sweeting in *Practitioner*, 1892.

Practitioner, May, 1896.

In Prussia both vaccination and revaccination are compulsory, and small-pox mortality is almost abolished.* Beginning with the year 1816, it is found that in that country previous to the law of 1874 the small-pox death-rate was 309 per annum per million of population. Since then, ending with 1892, it has been 15, and in the last ten years of the period only 7. Moreover, the compulsory vaccination age is the second year of life, and investigation showed that in 1886-90 more than two-fifths of the few deaths that occurred from small-pox were under two years of age. In Austria, where vaccination is not compulsory, the rate instead of being 7 per million as in Prussia, was 458 in the same period. In Belgium also vaccination is not compulsory, and in 1875-84 it had a rate of 441 per million as compared with Prussia's 22 in the same period. In Italy since 1888 vaccination of infants has been compulsory, as has revaccination of children attending *public* schools. Already a great improvement is indicated. In 1881-90 the small-pox death rate was 355 per million per annum, and in 1891-94 it was only 65. At the time of the European epidemic of 1870-75 Scotland, England, Sweden and Bavaria had a compulsory vaccination law, and their small-pox rates per million in the worst years were 1,470, 1,830, 1,660 and 1,660 respectively. Prussia, Holland, and Austria had no general compulsory vaccination, and their rates in the worst years were 5,060, 5,490, and 6,180. Coming to 1877-86, with vaccination not compulsory in Austria, with only infantile vaccination compulsory in England, and with vaccination and revaccination compulsory in Prussia, the average death-rate per million from small-pox in the capitals of these three countries was in Vienna 670, in London 250, and in Berlin 10. In London the rate would have been less but for the disease spreading from the small-pox hospitals that it then contained.

* As regards the Prussian vaccination laws *see* BRIT. MED. JOUR., 1894, vol. ii, p. 1213 and Dr. Edwardes in *The Practitioner* of May, 1896.

4. In classes among which there is much vaccination and revaccination there is little small-pox.

Royal Com. Final Report, s. 340.

In epidemics, as in London, Sheffield, and Warrington, revaccinated postmen and policemen remained safe in the midst of exposure to infection. Sir Charles Dilke stated in 1883 that the average strength of the permanent postal service in London was 10,504 in 1870-80, and yet during all that period, including the great epidemic, there was not a single death from small-pox, and only ten slight cases. In 1891-4, the employees of the General Post Office were over 55,000, yet there were only 17 cases of small-pox and one death though postmen owing to the nature of their duties are specially exposed to infection.

,, ss. 331-

In the Army and Navy, where a large majority of the men are successfully revaccinated there is very little small-pox—very much less than before revaccination became so prevalent.

Vaccination Vindicated, p. 106.

No persons are so terribly exposed to infectious diseases as are the nurses in fever and small pox hospitals. As regards fever nurses, Dr. Collie, Medical Superintendent of Homerton Hospital, declared that "the only way in which nurses become seasoned against fever is by taking the disease." At Homerton, Stockwell, and Liverpool Road Fever Hospitals, in the ten years ending 1881, 133 of the staff were attacked by various fevers, and 25 died. The Gateshead Medical Officer

Sir Richard Thorne in Royal Com. First Report, p. 38.

Royal Com. Final Report, s. 329.

wrote: "Every nurse who has been more than a fortnight in the typhus wards has suffered from typhus." In Newcastle in 1882 only 5 out of 14 nurses escaped typhus, and among the 9 attacks there were two deaths. In the Hospitals of the Metropolitan Asylums Board in 1887-95, no fewer than 704 of the attendants contracted scarlet fever, diphtheria, or enteric fever.

Royal Com. Final Report, s. 314, *et seq.*

How is it as regards small-pox? At Homerton Hospital in 1871-77 366 persons were employed. All but one were revaccinated and she was the only one who took small-pox. In the Highgate Hospital the Royal Commission found that since May, 1883, of 137 nurses and attendants 30 had had small-pox before entering the service. Of the other 107 all except the gardener were revaccinated, and the gardener was the only one who took small-pox. In the Sheffield hospitals, in the year ending 31st March, 1888, there were treated 1,798 small-pox patients. The total number of attendants, &c., was 161. Of these 18 had had small-pox previously and escaped attack; 63 had been vaccinated in infancy, of whom six were attacked and one died; the other 80 were successfully revaccinated, and not one contracted small-pox. In Leicester, however, where vaccination is neglected, some of the nurses refused revaccination. In the outbreak there the total hospital staff consisted of 40 persons. Of these 14 had either had small-pox or had been revaccinated before the outbreak, and 20 were vaccinated owing to the outbreak. mong these 34 (14 and 20) one mild case occurred in a nurse whose revaccination was ten years old. Six of the 40 nurses appear to have been imbued with anti-vaccination opinions, and refused revaccination. Only one of the six now needs any protection against small-pox. Five of them took it and one died.

5. In places where small-pox prevails it attacks a much greater proportion of the unvaccinated than of the vaccinated, especially where the vaccinations are comparatively recent.

Royal Com. Final Report, s. 248, etc.

In the Homerton Small-pox Hospital in over 10,000 cases treated by Dr. Gayton nearly 21 per cent. were unvaccinated, and among children under 10 the unvaccinated were no less than 47.6 per cent. The unvaccinated at this time (1873-84) in the population from which the cases were drawn did not amount nearly to 21 per cent., much less to 47 per cent. On the other hand, there is one hospital (Highgate) which does not admit children under seven and which draws its patients from a more universally vaccinated section of the population, and this hospital differed from others in London in that the percentage of unvaccinated patients was found to be much less, the difference being due to the difference in the ages of admitted cases, and the difference in the prevalence of vaccination in the population from which cases came.

Dr. McVail, Epidem. Soc. *Transactions*, 1896-7.

6. In houses invaded by small-pox in the course of an outbreak not nearly so many of the vaccinated inmates are attacked as of the unvaccinated in proportion to their numbers.

Royal Com. Final Report, ss. 234-247.

Taking children under 10 years old, in infected houses in Dewsbury, 10.2 per cent. of the vaccinated were attacked, and 50.8 per cent. of the unvaccinated; in Leicester, 2.5 per cent. of the vaccinated, and 35 per cent. of the unvaccinated; in Gloucester, 8.8 per cent. of the vaccinated, and 46.3 per cent. of the unvaccinated. These places are selected here because they are centres

of antivaccination, as to which it cannot be truthfully alleged that the unvaccinated are weakly children whose vaccination has been postponed by medical certificate, or that the vaccinated and unvaccinated children belong to different classes, especially when they are compared in the households actually invaded by the disease. It is urged by antivaccinationists that vaccination does not protect against small-pox, but on the contrary tends to weaken the system against all disease. Yet the vaccinated were attacked in much less proportion than the unvaccinated.

7. The fatality rate among persons attacked by small-pox is much greater, age for age, among the unvaccinated than among vaccinated.

Vaccination Vindicated, p. 88.

Taking the 10,403 cases treated in Homerton Hospital in 1873-84, the deaths among the vaccinated 8,234, were 869 or 10.5 per cent and among the unvaccinated 2,169, were 938, or 43.4 per cent. We shall see shortly that the deaths among the well vaccinated were only 3 per cent. Taking the epidemics in three towns, Dewsbury, Leicester, and Gloucester, where vaccination has been neglected, we find that under 10 years of age, among 72 vaccinated children attacked, two died or 2.7 per cent., but among 961 unvaccinated children attacked 350 died, or 37.3 per cent. Taking persons over 10 years old, among 1,959 vaccinated persons attacked, there were 136 deaths, or 6.9 per cent., and among 331 unvaccinated persons there were 75 deaths, or 22.6 per cent. Again it is to be noted that as vaccination was practically optional in these towns, the unvaccinated children, according to antivaccination theories, should have been more able to resist death by small-pox than those who had been subjected to an operation which is alleged to weaken the system and render it more liable to disease and death.

Royal Com. Final Report, ss. 202-230.

8. It cannot be truthfully alleged that independently of vaccination small-pox is a milder disease now than in former centuries.

If it were the case, as is sometimes argued by antivaccinationists, that the small-pox fatality rate in last century was about 18 per cent.* of persons attacked, then the much higher rate now occurring among the unvaccinated would show the disease to be much more severe now than then. But in the last century, as in the present century, the fatality varied greatly in different outbreaks, as does the fatality of scarlet fever, diphtheria, measles, &c. in the present century. And in epidemics in the present century, whether they be mild or severe, whether the fatalities be few or many, and whether there be much or little vaccination in the community, it is found that both the attack rate and the fatality rate are much greater in the unvaccinated than in the vaccinated in proportion to their numbers.

* This rate is based mainly on a prevalence of the disease in certain towns in the West Riding of Yorkshire in certain years between 1720 and 1730, but no average either for a century or for a country can be calculated on such limited data. (*Vaccination Vindicated* pp. 57-59.)

9. The degree of protection conferred by vaccination corresponds to the thoroughness with which the operation has been performed, three or four marks being much better than one or two, and a large mark much better than a small one.

Vaccination Vindicated, p 88.

In Dr. Gayton's 10,403 cases at the Homerton Hospital, 2,085 had good marks, and the fatality rate was 3 per cent.; 4,854 had in-

different marks, and the fatality rate was 9 per cent.; 1,295 were alleged to be vaccinated, but had no marks, and the fatality rate was 27 per cent.; and 2,169 were unvaccinated, and the fatality rate was 43 per cent. Taking "good" marks only, and attending to their numbers, Dr. Gayton found that with one mark, the fatality rate was 4.1 per cent.; with two marks, 3.3 per cent.; with three marks, 2.3 per cent.; with four or more marks, 1.5 per cent. The cases on which these percentages are founded were 529, 649, 518, and 389 respectively. Taking nearly 7,000 cases observed in recent years, the Royal Commission found that the small-pox fatality rate in persons with one mark was 6.2 per cent.; with two marks, 5.8 per cent.; with three marks, 3.7 per cent.; and with four marks, 2.2 per cent.

Royal Com. Final Report, ss. 272-298.

It is comparatively seldom that cases come to hospital with the small-pox eruption so far advanced and profuse as to obscure the vaccination marks, but in hospital statistics in this country a column is provided for "doubtful" cases, and if the figures for any large hospital be examined it will be seen that the inclusion of such cases either as "vaccinated" or "unvaccinated" does not alter the lesson taught by the statistics.

10. Sanitation cannot account for the facts above set forth.

Royal Com. Final Report, s. 174.

Whooping cough and measles deaths still belong to childhood as in the last century, while small-pox deaths have been removed from childhood to later periods of life. How could sanitation account for this differentiation? If it be suggested that because sanitation confers a special benefit on children it may have altered the age incidence of small-pox, the answer is got by looking at facts. In Germany, as we have seen, vaccination is not compulsory till the second year, and over 40 per cent. of all the small-pox deaths occur under two years of age. In Scotland the vaccination age is six months, and children under six months make just about the same contribution (138 deaths per 1,000 deaths) to the total small-pox deaths as they did (139 deaths per 1,000) before the vaccination law was passed. But in the next half-year of life—the half-year of vaccination—the contribution has fallen from 153 to 47. Surely this is vaccination and not sanitation. In a community attacked by small-pox, how could sanitation at home protect postmen going from door to door day after day in infected districts? In Leicester, how could sanitation account for the revaccinated nurses escaping small-pox, and the nurses who had refused revaccination taking small-pox? How could sanitation cause small-pox to pass over vaccinated children and seize on unvaccinated children in houses invaded by small-pox in Dewsbury and Leicester and Gloucester? How can sanitation have caused the fatality of small-pox cases to be much less among the vaccinated than among the unvaccinated in these towns, especially if vaccination weakens the system and makes it less resistant to disease as is alleged by anti-vaccinationists? How could sanitation cause children with three or four vaccination marks to have a less fatality from small-pox than children with one or two vaccination marks? In Glasgow, while sanitation was going from bad to worse in the early part of the century, vaccination was introduced and small-pox underwent an enormous diminution, though hospitals and isolation and disinfection were entirely out of the question. In Gloucester, vaccination had been neglected and in 1891 the secretary to the antivaccination league declared to the Royal Commission that Gloucester was a very clean town and had always been well abreast of sanitary improvements, and that its death-rate was very low. The Board of Guardians also wrote to the Commission on the same lines. But small-pox came, and the town suffered from a terrible epidemic, and ever since then the antivacci-

Sanitation or Vaccination. Jenner Society's publications.

Royal Com. Reports, vol. vi, p. 11.

Vaccination Inquirer, Dec. 1st, 1889.

nationists have been declaring that there was a great want of sanitation in Gloucester. What was wanting was vaccination.

For convenience the Registrar-General many years ago grouped together places whose death-rate was low and classified them as "healthy districts." They were nearly all found to be sparsely populated rural districts where though houses may be damp and overcrowded and other insanitary conditions prevail, there is little opportunity for infection. In such places, in spite of bad sanitation, there is a lower death-rate than in towns, because, independently of sanitary effort, the atmosphere is purer. Also there is less small-pox, and it comes at a later average age, because there is less facility for spread of infection on account of the smallness of the population and the distance of house from house and village from village. In such circumstances, though there is little sanitary effort, there is little small-pox, and unvaccinated persons have a better chance of escaping small-pox attack than they have in large towns where sanitary arrangements are more elaborate.

11. Though isolation of small-pox cases in hospitals is useful auxiliary to vaccination it is no substitute for it.

In an unvaccinated nation it would be utterly impracticable to provide sufficient small-pox hospitals. For whooping cough and measles hospital accommodation has not been seriously attempted, though these diseases cause an enormous mortality. Where, owing to vaccination, liability to small-pox is limited, hospitals are very useful and help to give time for general revaccination. But in an unprotected community, their almost certain breakdown is obvious. Who would have attended to the sick in Leicester if all nurses had had the same experience as the nurses who refused revaccination? In an unprotected community instead of small-pox being limited, it would spread in rapidly widening circles. Where a person protects himself by vaccination and revaccination he can defy small-pox. He carries his protection with him wherever he goes and a father can obtain protection both for himself and his family. Even if isolation in hospitals were made more stringently compulsory than vaccination has ever been in this country there could be no complete security. The protection of the individual might fail at any moment. It would depend not on himself but on other people. His cordon of protection would be a chain the measure of whose strength would be its feeblest link, and over not one link would he have efficient control. Failure of parents to observe the symptoms of illness; failure to call in a doctor; failure of the doctor to recognise small-pox; failure in promptitude of removal; inadequacy of hospital accommodation; insufficiency of disinfection of persons and things—these would be among the risks to which even a law of compulsory isolation would leave him exposed. Obviously the risk of collapse of voluntary isolation would be much greater.

12. Vaccination is very safe.

Nothing done by human beings is entirely without risk, but the risks of vaccination have been grossly exaggerated. Some of the earliest antivaccinationists held that the countenance of a vaccinated child might be transformed so as to assume "the visage of a cow." Later on, in the 'fifties, vaccination was accused of making people bald-headed, shortsighted, lazy, and of causing degeneracy in music, painting, oratory, poetry, &c. Still later, the habit has been to get statistical returns of increasing and decreasing diseases from the Registrar-General, and to attribute the increasing diseases to vaccination, and to use the decreasing diseases to illustrate the view that small-pox also might decrease without vaccination. But a disease

Vaccination Vindicated, pp.115,117,123-7.

may be increasing at one time and decreasing at another. Thus at one time cholera and enteric fever and scarlet fever were blamed on vaccination, but when these diseases began to decrease, their decrease was, and still is, held to show the needlessness of vaccination.

Royal Com. Final Report, s. 390.

One foul disease in particular has been blamed on vaccination. It happens that since Leicester gave up vaccination that disease has increased there much more rapidly among infants than in the rest of England. So also erysipelas, while it decreased in England by 16 per cent., increased in Leicester by 41 per cent. Similarly, diarrhœa, dysentery, and bronchitis, all of which have been blamed to vaccination, increased much more in Leicester than in England. The periods under comparison are 1863-67 and 1883-87. It is not to be supposed that the increase in these diseases is due to want of vaccination, but if instead of increasing they had diminished in Leicester, it is undeniable that their diminution would have been attributed by antivaccinationists to diminution in vaccination, just as increase of many sorts of disease has been attributed by them to vaccination where vaccination is not neglected as in Leicester. The Royal Commission made most careful search for injuries resulting from vaccination and, after the fullest consideration, arrived at the deliberate conclusion that such injuries are "insignificant" and "diminishing"

Royal Com. Final Report, s. 434.

and can be still further diminished. So insignificant are they that vaccination is nowhere more nearly universal than in the families of medical men, who love their children as other men do, and who know much better than other men can do, the exceeding safety of vaccination.

13. Calf lymph is now available to Boards of Guardians, &c., for the vaccination of every child in the country.

Reverting to the foul disease which has formed the principal allegation by antivaccinationists, it is to be noted that the use of calf lymph makes its occurrence through vaccination an absolute impossibility, as calves are not subject to that disease.

Copies of this pamphlet can be obtained at the offices of the British Medical Association, 429, Strand, London, and from the Jenner Society, Gloucester, at **64s. 6d.** *per 1000, or* **6s. 6d.** *per 100.*